Dynamics parameters of the functional state of physical fitness and morbidity in primary school children

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Summary

On the basis of data on the physical state of the examined 205 children of 7-10 years of age have been developed and implemented differentiated programs wellness swimming. After 72 sessions over 6 months was an increase in the level of health and physical fitness of primary school children. Reduced the number of days missed due to illness, the number of cases of acute disease, with 41% to 28% reduction in the number of sickly children.
Динамика показателей функционального состояния физической
подготовленности и заболеваемости детей

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Резюме

На основе полученных данных о физическом состоянии обследованных 205
детей 7-10 летнего возраста были разработаны и реализованы
дифференцированные программы оздоровительного плавания. После 72 занятий в
течение 6 месяцев отмечено повышение уровня здоровья и физической
подготовленности младших школьников. Уменьшилось количество дней,
пропущенных по болезни, количество случаев острой заболеваемости, с 41 % до
28 % уменьшилось число часто болеющих детей.
Under current conditions in a critical situation with the state of health and physical fitness of the child population of Ukraine. According to the Ministry of Health about 90% of children have different variations in health status, and according to Minmolodsporta 59% - an unmet physical fitness. Over the past six years in Ukraine were 15 deaths during the learning process in physical education. As one of the main reasons for this phenomenon is considered the inability of children to adapt to physical activity curriculum for physical education in the low level of health and inadequate adaptation reserves of the body [4].

Studies of many authors proved that training in water improves physical development, extend the functionality of the cardiovascular and respiratory systems, increase the intensity of the metabolic processes in the body, improve the processes of thermoregulation. Quality analysis used programs of teaching and training in swimming, suggests that developed and sold in the current program of swimming lessons for children, as a rule, do not provide the adequate solution of the twin problems of educational and recreational nature. In one embodiment, they are characterized by the pervasive use of rigidly normalized parameters of motor learning tools and can be broadly classified as express - swimming training methods, and in another case, a
program of exercise, do not go beyond rehabilitation or recreation and entertainment destinations. Most of the existing techniques for teaching children swimming designed to improve motor skills and technical training. Thus, as a rule, not enough attention is paid to the basic level of health and physical fitness, development of functional abilities of the body and prevent disease. The literature suggests that students do not perceive such tolerant tightly organized forms of employment with their pragmatic orientation and utilitarian goals. At the same time, almost no reasonable system of medical monitoring of children of primary school age, exercise in water [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12].

**Research problems**

1. Development and implementation in practice of physical rehabilitation younger students differentiated programs wellness swimming with the initial level of health and physical fitness and focus on the formation of children motivated interest in activities.

2. Medical control and evaluation of the effectiveness of course the impact of different health programs swimming.

**Methods:** we used the following methods: a theoretical analysis and compilation of scientific literature; case studies; anthropometry, the state posture, determines the level of physical development (IR) was determined by the level of physical performance (IR), clinical and physiological parameters, express -assessment of the level of physical health by G.L.Apanasenko, score some morbidity, assessment of physical
characteristics, methods of mathematical statistics. Statistical analysis of the data was performed using the package "Statistica 6.0" (StatSoft, USA), and spreadsheet "Excel 2000" (Microsoft).

**Study management**

Sequence of actions in research to improve the health of children is as follows:

1. Checking the health, fitness and swimming training.

2. Picking groups of children of primary school age in levels of physical health.

3. Securing medical support process improvement

   The study involved 205 children in grades 1-4 7-10 years (98 girls and 107 boys), the study examined functional somatometric somatoscopic and characteristics of children.

   Our studies indicate that the bulk of the junior class - children in low-and lower-middle-physical health, without marked gender differences have poor physical and swimming preparedness.

   Of the children surveyed were randomly selected younger students in the amount of 78 people of whom were formed control group (KG) (n = 38, 20 boys and 18 girls) and the main group (MG) (n = 40, 21 male and 19 girls) group. KG doing the traditional method of swimming training [13], and the MG according to our program that takes into account the level of physical health and physical fitness of schoolchildren. Control and main groups, participated in all phases of the study, which was carried out on the

With the organization of classes identified three stages:

Stage I (initial training) - used low-intensity exercise and low coordination difficulties.

Stage II (in-depth study) - used medium intensity exercise, increases coordination, the share of swimming exercises in the lesson.

Stage III (improvement) - increasing physical activity by increasing the density of motor coordination of activities and exercises. Increases the time of swimming exercise and swim distance.

Assess the level of preparedness of the swimming was held prior to the study, at the intermediate stage and at the end of the study.

Each phase of training ends control study, which summarizes the training and educational work.

**Results and discussion:**

We performed a study to determine the dynamics of the physical condition of children of primary school age under the influence of recreational diving promotional motor characteristics, levels of physical health and functional abilities of the body (including cardio - vascular and respiratory systems), and aimed at preventing disease.

Primary school age is a critical period in a child's development, strengthening its health. Acquisition of skills and abilities in the early school years is the most effective
at the level of involuntary memory (in particular in the game) than any [8]. In this connection the development of physical culture and health technologies with motivating students to improve health and physical fitness of the younger generation.

According to the results of our study, it was determined that the formation of motivation and efficiency of health and fitness classes in the water with children of primary school age to complement their mobile games and elements of competition. Water games are the most effective means of primary teaching swimming. They form the very first children needed for swimming motion, give rise to the development of physical qualities. With outdoor games and competitions in the water brought will, character, sense of community. The importance of these games is that they both develop motor and mental health problems of the child. To competitively-game method is characterized by:

- Emotion and rivalry exhibited in the rules of the game;

- Variability application of these skills in connection with the existing rules of the game;

- Comprehensive improvement of the physical, moral and volitional qualities: agility, strength, endurance, speed, orientation, as well as resourcefulness, courage and will to win.

In the classroom is of great importance to music. Music helps to achieve a given character movements, rhythm, tempo, amplitude, accelerates mastery of the movement. Musical accompaniment can be considered as a factor in a positive impact on the emotional state of children.
With the organization of classes to use individual-group method, in which the objectives and content of the program, the amount and timing of its implementation, were common to all students. In the MG adjusted individually for students, united in groups according to the Health Level (HL).

Table 1. The nature of the coordination of exercises in the classroom with children of the primary with different level of physical health.
Insignificant differences between boys and girls as physiological functions, indicators of physical qualities and level of preparedness swimming allowed to abandon gender approach in solving the problems of content development and program planning.

At the same time, there are significant differences in the levels of health and level of physical fitness. On the basis of these differences were completed subgroup of subjects and develop programs separately for children in low-and lower middle HL and children with average or above average HL. Each system was designed for 72 hours. Differences in levels of health and level of physical fitness determine the differences in the features of exercises - the rate, amplitude, exercise, intervals between them, etc. for each group.

The main tools employed in the classroom, is a complex exercise involving elements from the arsenal of swimming (primary education), synchronized swimming,
aerobics, water polo, games and fun in the water. Programs for low-and lower-middle, and for the middle and upper middle HL include most of the same sets of exercises, but they differ in volume, intensity and complexity of coordination. Exercise was based on the classical technique and divided into three parts: the preparatory, primary and final.

1. Preparatory part (10-15% of the time). The main objectives of the preparatory part were: training the body to perform certain muscle work, the creation of mental attitude for the upcoming activities.

2. The main part (up 70-75%). The purpose of the main part of the training was to improve the overall fitness of the body and its functionality, performance, and learning new exercises in the water, strengthening the skills acquired in previous lessons.

3. The final part (up 10.5%). Used to speed up the recovery process and to bring the body in an optimal zone of functioning, removal of high physical and emotional tension fixing swimming skills in the form of games, relay races, fun in the water.

Program for children in low-and lower middle HL wore expressed aerobic consisted of moderate-intensity exercise, which were carried out at the side of the pool and in the reference position. In large classes is often assigned the implementation of strength training with an emphasis on the impact of the major muscle groups, the number of repetitions of one exercise was 8-10.
Program for children with average or above average HL also consisted mainly of exercises of aerobic exercises of medium intensity. When using weight training reps is 10-12 times with a shorter duration of rest intervals between series. Exercises were carried out not only in the core, but in the unsupported position (Table 2)

Table 2. Distribution of recreational diving different orientation (%%) in classes with children of primary school age with different levels of physical health

<table>
<thead>
<tr>
<th>Character exercises</th>
<th>The level of development of health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>low below the average</td>
</tr>
<tr>
<td>Exercises to develop the aquatic environment</td>
<td>8,33 %</td>
</tr>
<tr>
<td>Exercises to develop and improve swimming skills</td>
<td>30,55 %</td>
</tr>
<tr>
<td>Running in the water</td>
<td>20,83 %</td>
</tr>
<tr>
<td>Strength training in water</td>
<td>16,66 %</td>
</tr>
<tr>
<td>dance elements</td>
<td>2,77 %</td>
</tr>
<tr>
<td>Elements of synchronized swimming</td>
<td>6,94 %</td>
</tr>
<tr>
<td>The elements of water polo</td>
<td>5,55 %</td>
</tr>
<tr>
<td>Swimming</td>
<td>8,33 %</td>
</tr>
</tbody>
</table>
Higher rates of HL boys MG, compared with KG, were achieved by statistically higher (p <0.05) values of the index Rufe, the power index (p <0.05), Robinson index (p <0.05). In girls, the MG is statistically significant (p <0.05) higher rates of HL were achieved by increasing the level of physical performance (based on the index Rufe) and Robinson index (p <0.05).
Table 3. Indicators of physical health of children and control group before and after swimming wellness

<table>
<thead>
<tr>
<th>Data</th>
<th>Control group (n=38)</th>
<th>Main group (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>before</td>
<td>after</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Control group (n=38)</th>
<th>Main group (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>before</td>
<td>after</td>
</tr>
</tbody>
</table>

| Running 30 m, sek | g      | 5.86  | 0.45  | 5.75  | 0.45  | 5.78  | 0.36  | 5.53* | 0.39  |
|                   | b      | 5.65  | 0.47  | 5.4*  | 0.38  | 5.50  | 0.55  | 5.20* | 0.27  |

| “Shuttle” Run 4 × 9 m, sek | g      | 12.30 | 0.54  | 12.26 | 0.53  | 12.27 | 0.44  | 11.93** | 0.28  |
|                           | b      | 12.01 | 0.76  | 11.65 | 0.57  | 11.78 | 0.71  | 11.25** | 0.38  |

| Flexion and extension of hand-ups, time | g      | 8.38  | 3.22  | 8.88  | 3.08  | 9.81  | 3.65  | 11.42** | 3.96  |
|                                          | b      | 15.00 | 8.48  | 16.75* | 7.09  | 15.90 | 8.02  | 21.04** | 5.60  |

| Long jump from their seats, sm | g      | 137.7 | 11.73 | 141.22* | 11.54 | 143.29 | 13.29 | 150.10** | 11.34 |
|                                | b      | 153.4 | 16.30 | 160.35* | 11.73 | 154.36 | 13.66 | 168.42** | 9.05  |

| The rise in the saddle body for 1 min, time | g      | 32.88 | 5.76  | 35.05* | 5.82  | 33.48 | 5.54  | 36.84* | 6.55  |
|                                            | b      | 35.3  | 7.20  | 37.3  | 8.19  | 34.90 | 8.33  | 38.85* | 5.99  |

| Torso from a seated position, sm | g      | 9.44  | 3.41  | 11.66* | 3.54  | 8.55  | 6.61  | 16.68** | 3.85  |
|                                  | b      | 5.15  | 3.60  | 6.95  | 2.94  | 3.45  | 4.19  | 6.71   | 3.93  |

<p>| Index Rufe, conditional | g      | 13.11 | 1.62  | 12.35 | 1.28  | 12.55 | 1.28  | 10.04** | 1.35  |</p>
<table>
<thead>
<tr>
<th>units..</th>
<th>b</th>
<th>13,04</th>
<th>1,44</th>
<th>11,84*</th>
<th>1,49</th>
<th>12,91</th>
<th>1,92</th>
<th>9,77**</th>
<th>1,68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life index, conditional units</td>
<td>g</td>
<td>50,52</td>
<td>7,66</td>
<td>53,04*</td>
<td>5,86</td>
<td>49,54</td>
<td>8,60</td>
<td>54,45*</td>
<td>6,09</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>53,39</td>
<td>9,58</td>
<td>56,24*</td>
<td>9,58</td>
<td>51,76</td>
<td>8,71</td>
<td>57,15*</td>
<td>8,11</td>
</tr>
<tr>
<td>The power index, conditional units.</td>
<td>g</td>
<td>21,64</td>
<td>6,76</td>
<td>26,94*</td>
<td>5,44</td>
<td>21,86</td>
<td>5,66</td>
<td>28,88*</td>
<td>6,56</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>25,16</td>
<td>5,83</td>
<td>35,15*</td>
<td>9,23</td>
<td>24,41</td>
<td>8,66</td>
<td>43,78**</td>
<td>9,69</td>
</tr>
<tr>
<td>Index Robinson, conditional units.</td>
<td>g</td>
<td>90,96</td>
<td>7,50</td>
<td>88,43</td>
<td>8,13</td>
<td>90,97</td>
<td>6,89</td>
<td>80,62**</td>
<td>6,16</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>89,89</td>
<td>9,09</td>
<td>85,36*</td>
<td>8,95</td>
<td>88,80</td>
<td>11,21</td>
<td>79,75**</td>
<td>7,46</td>
</tr>
<tr>
<td>HFA, points</td>
<td>g</td>
<td>1,88</td>
<td>1,74</td>
<td>2,83*</td>
<td>2,28</td>
<td>2,15</td>
<td>1,64</td>
<td>5,84**</td>
<td>2,38</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>1,8</td>
<td>2,04</td>
<td>3,5*</td>
<td>2,91</td>
<td>2,33</td>
<td>2,37</td>
<td>6,38**</td>
<td>3,63</td>
</tr>
</tbody>
</table>

Notes: * - statistically significant difference between the rates before and after the experiment (p < 0.05); ** - Statistically significant difference between the study and control group (p < 0.05)

Table 4. Indicators of physical fitness of children and control group before and after improving navigation

Notes: * - statistically significant difference between the rates before and after the experiment (p < 0.05); ** - Statistically significant difference between the study and control group (p < 0.05)

Before the course navigation performance of physical fitness of children were not significantly different (p > 0.05).

Operational control of the response of the body involved in the training load was performed on heart rate after the exercises. Current control (control of functional changes in the state of the body involved, the reaction of the organism to the standard load of HR performed in 6-12 sessions). Landmark control was performed by comparing the baseline level of functional and physical training dealing with those at 3
and 6 months of training.

After course swimming level of physical fitness as in the CG, and the exhaust gas under the influence of increased employment. But in the MG, these results were more pronounced (Table 4).

Significant difference between the KG and the exhaust (p <0.05) was observed in these rates as agility ("shuttle" running 4 × 9 m), strength (flexion and extension arms-ups) and speed-strength performance (jump in length away, cm), and the girls as well - flexibility (trunk bent forward from a sitting position, cm). After the course traced changes in indicators of preparedness swimming towards improvement in the control and in the intervention group (p <0.05). One measure of the effectiveness of the approaches used in the rehabilitation of students is the frequency of acute illnesses and their duration. At baseline incidence rates between treatment groups did not differ among themselves. However, on the second or third week of training run average sick days in all groups increased 2-fold, the number of missed classes in the exhaust was for boys and girls, respectively, 5.90% and 7.56%, in the CG - 5.74% and 10.31%. The highest rates are observed in the incidence of acute CG girls, where the difference in absenteeism compared to the OG of 2.75%. The fourth week of health programs of missed classes in the OG and CG decreased. In the OG it was 2.31% in males and 2.96% in girls. In CG the level was higher. Thus, in the course of the study the children missed school less exhaust to 3.08% than children KG. This confirms the data A. Scalia
that in the early days of training in the pool is not going increase the effectiveness of the temperature control and the baby is in a relatively unstable to the low temperature of the water compared to air. According to these data, resistance to water temperature in the pool is for 8-10 sessions.

Lower incidence of students exhaust is because the children are doing on differentiated programs with competitively-game character in the water, present a positive effect of emotional recovery, unlike the children of KG, who were engaged in the traditional program of swimming training (hard-normalized swimming of individual segments, that is probably a sense of monotony and certain psychological discomfort). Thus, during the study in the exhaust gas was observed more marked improvement in reducing the incidence of children.

During the study period in the exhaust gas, and in the CG showed a decrease in the incidence of acute illness in the school year, and the number of days missed due to illness. In CG reduction was: girls - an average of 4 days, the boys - 3 days, in the OG girls - 5 days, the boys - 7 days (p <0.05).

The results showed that children emissions and a decrease in the number of CG missed classes due to illness, from 29% to 18% as well as reducing the number from 41% to 28% of sickly children. In this case, the children exhaust more pronounced decrease in the number of missed classes due to illness and reduced the number of sickly children compared to CG (p <0.05).
ANALYSIS AND SUMMARY OF THE STUDIES

After the implementation of health program level of physical performance, both in the control and in the intervention group improved significantly decreased the number of children in low-and lower-middle level of physical performance compared to the baseline. However, higher rates were observed in the core group of children, boys and girls: 41.5% and achieved an average 7.5% higher than the average level of physical performance, compared to 22.6% and 2.6% of control children the group.

Analyzing the dynamics of the functional state of the cardiovascular and respiratory systems involved, it should be noted that all children decreased heart rate at rest (p <0.05), improved performance index Rufe (p <0.05), the power index (p < 0.05), decreased systolic heart function at rest (Robinson index, p <0.05). There was a statistically significant improvement in the results in the exhaust gas compared to the CG performance Genci samples (p <0.05), heart rate parameters at rest (p <0.05).

Along with improved functional status younger students, improved performance and physical fitness: speed (18%), endurance (25%), energy (15%), speed and power capacity (23%) and flexibility (28%) . Analysis testing of physical characteristics of children of the experimental group (KG) showed that these children outperform their peers on indicators such as flexibility, agility, strength and endurance.

As a result of recreational diving course is marked and positive change in terms of acute illness: Reduce the number of cases of acute disease in the studied schools and the
number of days missed due to illness. A decrease in the number of missed classes due to illness, from 29% to 18% as well as reducing the number from 41% to 28% of sickly children. Children MG were significantly (p <0.05) symptoms benefits in some aspects characterizing a decrease in morbidity compared to children KG.

These changes are the most conclusive criterion in assessing the effectiveness of training in the pool with the children of primary school age, especially with differentiated programs with elements of recreational swimming competitively-game character in the water, with the level of physical health

CONCLUSIONS:

1. Based on the data on the physical state of surveyed differentiated programs designed with elements of recreational swimming competitively-game character in water, separately for children in low-and lower middle HFA and children with average or above average HFA, justified and implemented, which is available in wide use, the technique medical monitoring of children of primary school age who have recreational swimming, with their level of physical fitness.

2. The 72 hours after the implementation of the 6-month program, engaged in recreational diving a statistically significant increase in the level of health in all sex-age groups surveyed. In this case, all children decreased heart rate at rest (p <0.05),
improved performance index Rufe (p <0.05), the power index (p <0.05), decreased systolic heart function at rest (index Robinson p <0.05) and increased the duration of breath as you exhale (Genci test, p <0.05).

3. For the younger students, engaged for 6 months and wellness swimming, made improvements in physical fitness on such indicators as agility p <0.05 ("shuttle" Run 4 × 9 m), the strength of p <0.05 (flexion and extension arms -ups, time) and speed-strength capabilities p <0.05 (long jump away, cm). The girls also noted the positive dynamics in the development of flexibility (trunk bent forward from a sitting position, cm, p <0.05);

4. As a result of your exercise program, recreational swimming there was a decrease of cases of acute illness and the number of days missed due to illness from 29% to 18%, and a decrease from 41% to 28% of sickly children.

5. Children OG, who were engaged at tiered health programs with elements of swimming competitively-game character in the water, were significantly (p <0.05) evidence of the benefits of a number of indicators characterizing the increase in health and physical fitness, as well as to reduce the incidence, compared to children KG, who were engaged in the traditional program of swimming training, causing a feeling of monotony and certain psychological discomfort.

6. Results of the study show the effectiveness of recreational diving activities with proper medical supervision, thus improving the performance of the physical state (functional performance, physical health, physical fitness and swimming) children of primary school age.
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Keywords: differentiated programs recreational swimming, medical control, the level of physical fitness, functionality, fitness, children of primary school age.

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